of the result indicated by a majority of the channel and heart rate detector combinations. Continuing with the particular example discussed above involving the QRS and axis detectors, conflicts between QRS detector results on separate channels are resolved in favor of the channel with a result that agrees with the axis detector result.

In act **510**, if the all of the interpretations, or the favored interpretations, of the ECG signals indicate that a heartbeat has occurred, the cardiac function analyzer **102** records the occurrence of a heartbeat in act **512**. Otherwise, the cardiac function analyzer **102** determines if an interruption in monitoring is about to commence, such as an interruption caused by shutdown of the electrode system, in act **514**. If so, the cardiac function analyzer ends the process **500** at **516**. Otherwise, the cardiac function analyzer **102** returns to act **504** and the process **500** continues.

Examples in accord with process **500** enable an electrode system to more accurately track patient heart rate. More accurate heart rate tracking results in several benefits. These benefits include more accurate patient historical information and generation of fewer falsely indicated arrhythmias. Fewer false arrhythmias, in turn, may result in avoidance of unnecessary alarms and delivery of therapy to a patient, thereby increasing the runtime between charges of the electrode system and avoiding unnecessary patient discomfort.

Each of the processes disclosed herein depicts one particular sequence of acts in a particular example. The acts included in each of these processes may be performed by, or using, an electrode system specially configured as discussed herein. Although described herein in association with an electrode system of a wearable defibrillator such as the LIFEVEST Cardioverter defibrillator, embodiments disclosed herein may be used with any electrode system, including conventional stick-on adhesive electrodes, dry capacitive ECG electrodes, radio transparent electrodes, etc. Some acts are optional and, as such, may be omitted in accord with one or more examples. Additionally, the order of acts can be altered, or other acts can be added, without departing from the scope of the systems and methods discussed herein. In addition, as discussed above, in at least one example, the acts are performed on a particular, specially configured machine, namely an electrode system configured according to the examples disclosed herein.

Usage Scenario

FIG. **6** illustrates two exemplary idiosyncratic ECG signals **600** and **602** received by an exemplary electrode system. As shown, the ECG signal **600** was acquired via a side-to-side (SS) channel and includes QRS complex **604**. The ECG signal **602** was acquired via a front-to-back (FB) channel and includes QRS complex **606**. As illustrated, the ECG signal **600** may be double counted by conventional derivative-based QRS complex detectors because the QRS complexes presented within the ECG signal **600**, such as the portion of the ECG signal indicated by reference number **604**, are elongated and exceed the default configuration of the refractory period. Thus, conventional derivative-based QRS complex detectors may detect a first QRS complex at the onset of the QRS complex **604** and detect a second QRS complex near the end of the QRS complex **604** after the refractory period has expired.

According to one example, a user, such as a physician, may perform act **206** of process **200** and thereby determine that the SS channel is susceptible to double counting by comparing the morphology of the ECG signal acquired via the SS channel to an ECG signal representative to a normal sinus rhythm. Further, the user may perform act **208** by configuring preference information to rank the FB channel higher than the SS channel. After receiving this preference information and during the execution of process **400**, the exemplary electrode system favors the FB channel over the SS channel if the two channels yield differing heart rates. This approach results in a decreased likelihood of heartbeat double counting because the QRS complexes displayed within the FB channel do not extend beyond the programmed refractory period and are, therefore, less likely to be double counted.

Having thus described several aspects of at least one embodiment of this invention, it is to be appreciated various alterations, modifications, and improvements will readily occur to those skilled in the art. Such alterations, modifications, and improvements are intended to be part of this disclosure, and are intended to be within the scope of the invention. Accordingly, the foregoing description and drawings are by way of example only.

What is claimed is:

1. An ambulatory medical device comprising:

a plurality of electrodes disposed at spaced apart positions about a patient's body; and

a control unit including:

a sensor interface coupled to the plurality of electrodes and configured to receive a plurality of ECG signals from a plurality of pairings of the plurality of electrodes;

a memory storing a configurable parameter indicating at least one preferred pairing of the plurality of pairings; and

at least one processor coupled to the sensor interface and the memory, the least one processor implementing a cardiac function analyzer to process the plurality of ECG signals to determine a plurality of signal interpretations of a physical condition of the patient, to detect a difference in the physical condition of the patient under two or more signal interpretations of the plurality of signal interpretations, and to resolve the difference by retrieving the configurable parameter and resolving the difference in favor of the at least one preferred pairing.

2. The ambulatory medical device of claim **1**, wherein the cardiac function analyzer is further configured to identify automatically the at least one preferred pairing during operation of the ambulatory medical device.

3. The ambulatory medical device of claim **2**, wherein the cardiac function analyzer is configured to identify the at least one preferred pairing by comparing at least one signal interpretation derived from the at least one preferred pairing to a benchmark.

4. The ambulatory medical device of claim **3**, wherein the benchmark includes a signal interpretation of at least one of a normal cardiac rhythm and the patient's cardiac rhythm.

5. The ambulatory medical device of claim **4**, wherein the patient's cardiac rhythm is recorded during initial prescription and fitting of the ambulatory medical device.

6. The ambulatory medical device of claim **5**, wherein the cardiac function analyzer is further configured to adjust the benchmark to match a composite ECG signal summarizing historical ECG signals of the patient.

7. The ambulatory medical device of claim **6**, wherein the historical ECG signals fall within a moving window of a predefined duration.

8. The ambulatory medical device of claim **1**, wherein the cardiac function analyzer is further configured to identify at least one of one or more detection methods and one or more refractory periods for the at least one preferred pairing.

9. The ambulatory medical device of claim **8**, wherein the cardiac function analyzer is further configured to adjust the